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AN IMPROVED METHOD FOR REARING THE MONARCH BUTTERFLY

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FOR SEVERAL YEARS I have been producing Monarch butterflies for migration studies (Urquhart, Urquhart, and Munger 1968 (1970)) and for material in kit form for students and teachers of elementary schools. For these purposes I needed an efficient method of producing quantities of insects which would become butterflies at a predictable time. The method developed is a modification and improvement of a method described previously (Munger and Harriss 1969 (1970)).

I use the milkweed *Asclepias curassavica* to attract egg-laying females and for feeding the larvae in the laboratory because it is perennial and capable of putting out continuous growth in a subtropic climate. Females fed on honey-water in a warm, well-lighted, cloth-covered cage lay eggs on milkweed cuttings. Eggs in lots of 100 or less on pieces of leaves and stems are incubated on pieces of glass under clear, plastic drinking glasses 3½ inches in diameter and 3 inches tall.

The newly-hatched caterpillars are fed tender leaves. When the larvae are in the second or third instar, the drinking glass cages, along with the larvae and the leaves they are feeding on, are transferred to "feeding boards" (Fig. 1).

Feeding boards are smooth, white-enameled pieces of ¾-inch wood 4½ inches wide and about 30 inches long. These boards are supported at each end on pieces of wood shaped to hold one edge ¾ inch higher than the other edge, and are spaced about ½ inch apart. When fresh leaves are given to the caterpillars, and the cages need cleaning, the slope of the boards aids in brushing off the debris. The debris is collected on a removable cardboard tray beneath. As the caterpillars eat and grow, they are gradually distributed among other glass cages to prevent over-crowding.



Fig. 1.—Plastic glass cages with Monarch caterpillars on sloping feeding boards.

When the caterpillars reach the fifth instar and are about to begin their heavy feeding they are transferred to special cages. Here they finish their growth and suspend. The special cage (Fig. 2) is a wooden frame 4 inches tall and about 10 inches square covered on 2 sides, on the inside, with window screening and on the bottom with $\frac{1}{4}$ -inch mesh galvanized wire cloth. The top of the cage is covered with a removable sheet of $\frac{1}{8}$ -inch Plexiglas. There is a wooden handle on one side near the top. The cage rests on a painted cardboard tray to prevent the escape of caterpillars.

The under side of the Plexiglas is coated with a very thin layer of paraffin. The paraffin is applied with a soft cloth that has been rubbed on a cake of paraffin. The purpose of the paraffin is to allow easy removal of suspended caterpillars. The cage has a capacity of about 50 caterpillars. The caterpillars in each cage should be of somewhat different ages so that not too many will be spinning mats at the same time.

With the great consumption of food, fecal pellets accumulate rapidly. Cleaning the cage is a simple matter: lift it by the handle, brush the under side of the wire cloth with a stiff paint brush, and set the cage on a clean tray. Rather large amounts of milkweed can be put in the cage at one time, as needed.

When the larvae are full-grown they crawl to the Plexiglas, spin mats and suspend. A sufficiently thin coat of paraffin does not prevent adhesion of the silk; at the same time it allows one to peel off the silk with a larva attached. If there is too much paraffin on the Plexiglas, however, the silk comes off too easily, and the attachment is not strong enough to hold the caterpillar. The silk appears to adhere partly by reason of an electric charge. Ordinary glass is not a satisfactory cover for the cage because the silk cannot be removed easily from it.

The peeling is started with a small, soft-wood stick, such as a broken swab stick, and finished with the fingers. If the larvae are very close together, the matting can be divided with the stick before peeling it off.

After the larvae are removed, they are clipped by their silk to wooden, spring-type clothes pins and set in chronological order, with date-of-suspension labels, on a storage rack (Fig. 3) where they transform and can also emerge. As suspended larvae are removed, they are replaced by transferring young, fifth instar larvae to the cage, thus making the rearing in the special cage continuous.

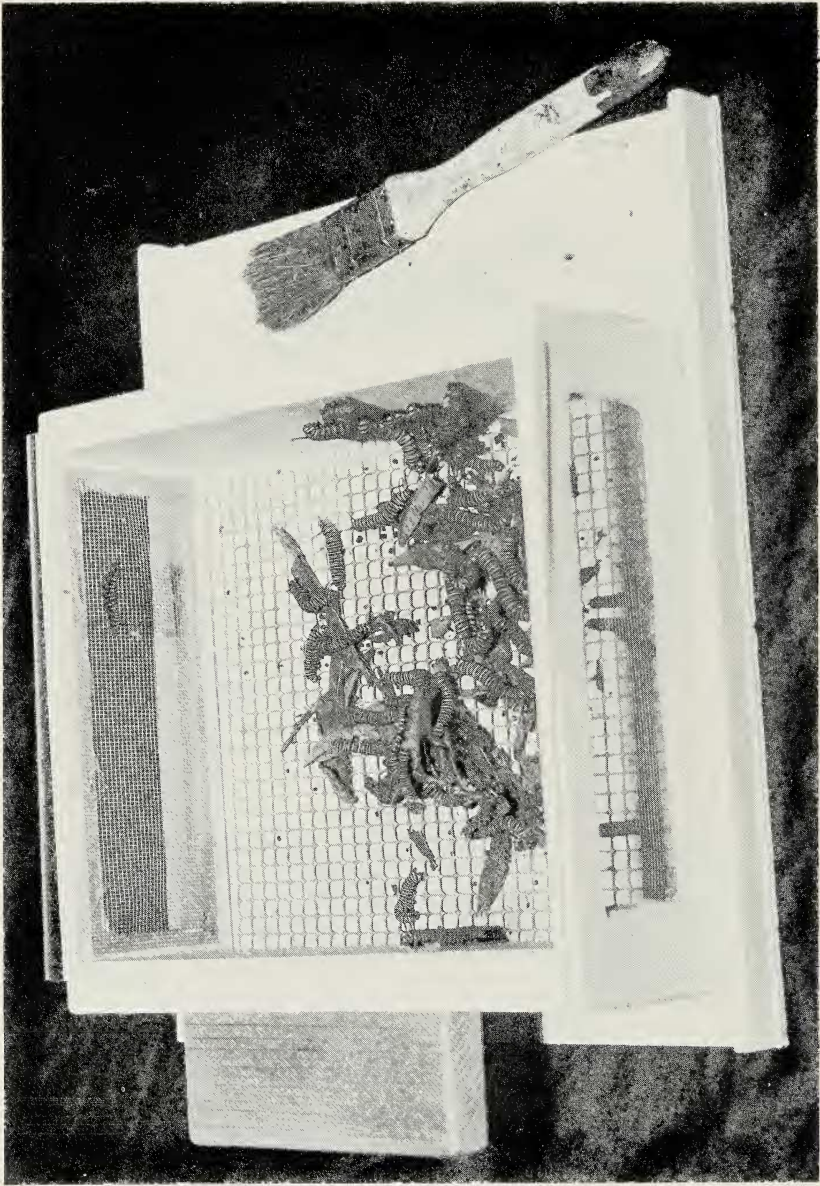


Fig. 2.—Special cage for growing fifth instar Monarch caterpillars.

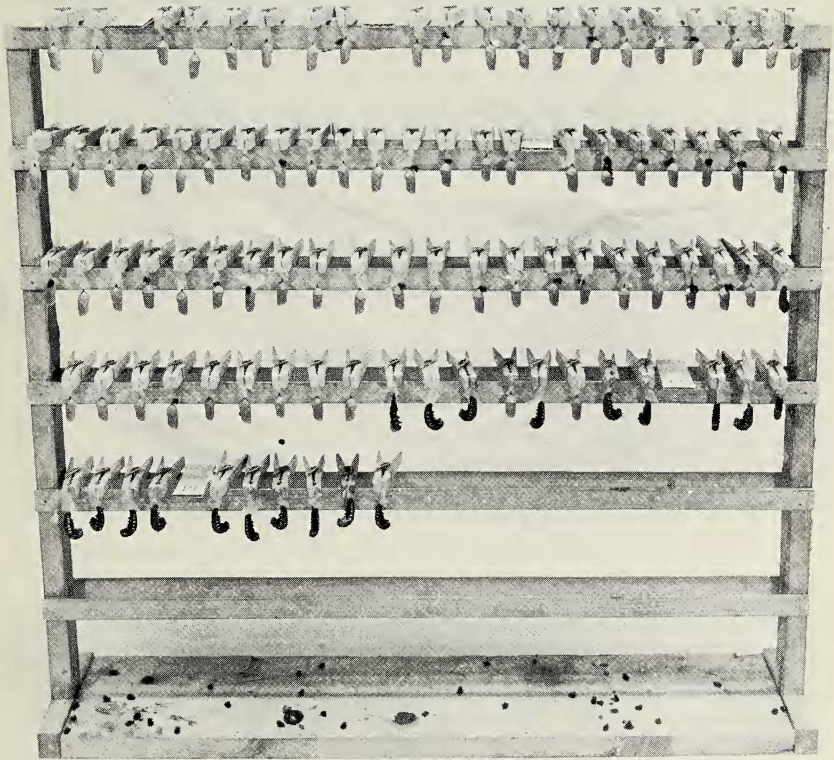


Fig. 3.—Storage rack for Monarch butterfly pupae.

The storage rack is made of 2 upright pieces of wood $\frac{3}{4}$ inch thick and $1\frac{1}{2}$ inches wide fastened to a wooden base $\frac{3}{4}$ inch thick, 6 inches wide, and about 3 feet long. Thin, paired strips of wood are then fastened opposite each other to the edges of the uprights. Several such pairs are fastened to the uprights about 4 inches apart.

After the pupae are 2 days old they are hard enough to be removed from the rack and laid in cotton-cushioned containers. In containers of this type pupae can be placed in a cool or warm place to slow or hasten development, and then returned to the rack to emerge. When properly cushioned, pupae can be shipped safely by mail.

Note: Seeds of *Asclepias curassavica* are available from Harry E. Saier, Dimondale, Michigan 48821.

REFERENCES

- MUNGER, F. and THOMAS T. HARRISS, (1969 (1970)). Laboratory Production of the Monarch Butterfly, *Danaus plexippus*. *Jour. Res. Lepid.* 8(4): 169-176.
- URQUHART, F. A., N. R. URQUHART, and F. MUNGER, (1968(1970)). A Study of a Continuously Breeding Population of *Danaus plexippus* in Southern California Compared to a Migratory Population and its Significance in the Study of Insect Movement. *Jour. Res. Lepid.* 7(4): 169-181.

Note: Since the above was written, I found that polishing the Plexiglas with automobile wax was as effective as paraffin and easier to apply.